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## Skills

Python, C++, SQL, Git/GitHub, JAX (automatic differentiation, GPU acceleration), Machine Learning, Go, Golang, Julia, OpenCV, Geospatial Data Processing, Mathematical Modelling, Dynamical Systems, Statistical Computing, Algorithm Design, Linux/Command-line Tools, CLI, Scientific Communication, L<sup>A</sup>T<sub>E</sub>X, Teaching and Mentoring

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## Education

### University of Manchester / Martingale Scholarship

*Sept 2025 - Sept 2026*

- Pure mathematics specialising in analysis and geometry
- Additional module studying dynamical systems
- Dissertation on the analysis of dynamical systems
- Nine months taught, three months research

### University of Cambridge / Integrated Masters

*Oct 2020 - June 2025*

- Specialism in theoretical physics and statistical computing
- Final research project on statistical sampling in high dimensions
- Proved the correctness of a novel Hamiltonian Monte Carlo sampling algorithm
- Implemented my research project using JAX
- Final exams from the Part III Mathematics course:
  - Quantum Field Theory; Symmetries; General Relativity; Astrostatistics

### The Blue School Sixth Form / A-level

*Sept 2016 - July 2018, Wells (Somerset)*

- Mathematics (A\*), Further Mathematics (A\*), Chemistry (A\*), Physics (A\*), Biology (A)
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## Experience

### Freelance - Machine Learning / Summer School Tutor

*Summer 2025*

- Code available on my GitHub under harveywilliams56/CambridgeLondonCamp
- Introduced Loss Functions, Automatic Differentiation and Gradient Descent
- Demonstrated the influence of learning rate on convergence using linear regression
- Discussed how this generalises to neural nets and CNN architectures
- Demonstrated transfer learning with the Fast.AI library in Python

### Gurdon Institute/Cambridge Centre for Physical Biology / Researcher

*Summer 2024*

- Wrote a computer simulation of collective cell motion based on research papers
- Worked with minimal supervision, selecting Go as an appropriate programming language
- Highlighted several mathematical and algorithmic mistakes in the literature
- Analysed scaling of possible algorithms
- Argued for and implemented an improved approach (Delaunay Triangulation)
- Refactored existing code to improve clarity
- Advised a group at Oxford and presented to an international collaboration carrying out similar research

### Cambridge Centre for Carbon Credits / Researcher

*Summer 2023*

- Produced a pipeline processing data from an SQL database into a geospatial format
- Optimised code around a library bug - reducing memory consumption from 16GB to ~1GB
- Ensured the code is accessible via GitHub and well commented

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## Experience

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### Teamline / Year in Industry (YINI)

*Aug 2019 - Aug 2020, Cambridge*

- Completed the hardware section of Nand2Tetris, which has given me a basic understanding of computer architecture
- Wrote API based code in Python for a R&D project
- Automated visual testing with OpenCV-Python, using Linux tools to access hardware information
- Presented test results to other members of the team
- Raised a major concern directly with my manager, preventing flawed units being shipped to customers
- Organised a group entry into the Google Code Jam competition for all the interns/grads

### Homerton College / Student Ambassador

*Summer 2022*

- Assisted in the college open day and ran tours throughout Summer

### Cambridge Admissions Office / eCAMbassador

*July 2021 - January 2022, Remote*

- Mentored university applicants from disadvantaged backgrounds, sharing insight and providing feedback on personal statements

### St Michael's Mount / Guide

*July 2021 - September 2021, Cornwall*

- In addition to my role guiding visitors, I completed a voluntary first-aid course and put it to use

### The Blue School / Teaching Assistant (maths dept.)

*Oct 2018 - April 2019, Wells (Somerset)*

- Coordinated with teachers to support GCSE pupils in class
- Planned and delivered small group lessons

### Wells Cathedral Catering / Catering Assistant

*June 2016 - August 2018, Wells (Somerset)*

- Part-time job during my A-levels

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## Volunteering & Awards

- Martingale Scholar 2025-2026
- Selected as Vice-Captain for University Challenge 2025, representing Homerton College
- Oxford UNIQ+ summer research scholarship 2024 — declined due to an alternative offer
- Martingale Scholarship 2024-2025 — declined as deferral was not possible
- Wrote and delivered a UACAS session to Oxbridge applicants at my former school
- Undergraduate year-rep for Part IB Physics
- Competed for Homerton College Boat Club
- I'm also a keen runner and would love to join any office charity runs